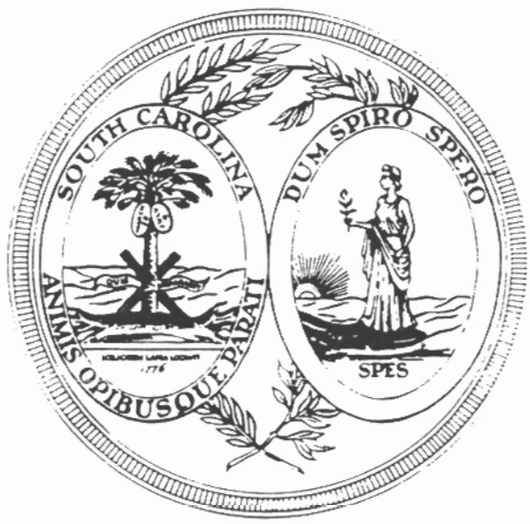
GENERAL OBJECTIVES AND COMPONENTS OF CONTAMINATION ASSESSMENTS AND REMEDIAL ACTIONS

Guidance Document



South Carolina Department of
Health and Environmental Control

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Introduction

The South Carolina Department of Health and Environmental Control (Department) has developed minimum criteria or "core elements" for soil/groundwater contamination assessments and remedial actions. This document was developed to help prevent significant "rework" for sites that come under regulatory authority of more than one regulatory program (or that switch from one regulatory program to another), and to inform the regulated community of the basic elements of assessments and remedial actions common to all groundwater programs in the Department. Specific elements may vary slightly between regulatory programs. It should be noted that the Department will need to review and approve most work plans and reports related to the assessment and remedial action process. All plans, reports and associated work should be performed by, or under the direct supervision of, qualified registered professionals.

This guidance document outlines the **general** objectives and components of contamination assessments and remedial actions from site discovery to site clean-up. The document, however, does not contain specific details regarding methods and technologies to be used for assessments and remedial actions. Instead, the site-specific work plan(s) should contain details such as proposed field sampling techniques, analytical methods, QA/QC procedures, report contents, etc.. Numerous guidance documents are available from the Department and the U.S. Environmental Protection Agency regarding appropriate methods and technologies to be used to conduct proper assessments, and select, design and implement a remedial action. Any reference, or lack of reference, to any specific assessment or remedial technology does not imply endorsement or lack of endorsement of a particular technology. The referenced technologies are discussed for illustrative purposes only. Any alternative technology which accomplishes the same goal, meets all regulatory requirements, and adequately protects human health and the environment will be considered by the Department.

I. Initial Site Investigation

The objective is to determine whether a problem exists, if not already evident.

A. Review available facility and/or regulatory records to determine site history, past site uses, and the location and nature of potential sources of contamination.

B. Perform initial sampling and analyses of waste and/or potentially affected media, if warranted.

C. Department personnel conduct site visit, as appropriate.

II. Site Assessment

The objectives are to: 1) identify <u>all</u> sources of contamination; 2) completely define the lateral and vertical extent of the contamination in the affected media (e.g., soil,

groundwater, surface water and/or air); 3) identify the concentrations, chemical nature, mobility and toxicity of the contaminants; 4) identify exposure pathways to sensitive receptors (e.g., humans); 5) identify risks to sensitive receptors if an exposure pathway exists; and 6) in general, obtain the data necessary to allow an informed decision to be made concerning future actions (i.e., monitoring, design an appropriate and effective remedial action, etc.).

A. Site Assessment Work Plan(s) - Prior to preparing the plan, a meeting with Department personnel may be appropriate to identify the major issues to be addressed and included in the work plan. The actual number and content of work plans will be determined on a site-specific basis; however, it is the goal of the Department to have comprehensive and dynamic work plans prepared in order to reduce the number of phases of work needed to properly assess a site. A dynamic work plan would allow for possible changes in the scope of work to account for unexpected site conditions, data obtained during the study, etc.. Such a work plan may contain contingency plans, decision matrices, etc.. In addition to the proposed work, the plan should summarize the site history and any previous work performed at the site.

B. Site Assessment Implementation

1. Determine Nature and Extent of Contamination

a. Identify all contaminant sources and affected media. Sample potentially affected media (waste, lagoon sludge, soil, sediment, surface water, groundwater, air, building surfaces, etc.), as appropriate.

b. Identify all contaminant types and concentrations. The chemical quality of affected media at key source and/or sample locations should be fully characterized for an appropriate comprehensive list of parameters based on the suspected and/or known contaminant(s) released [e.g., Target Compound List (TCL), Target Analyte List (TAL) and Tentatively Identified Compounds (TIC's); RCRA Appendix IX List; Priority Pollutant List; or worst-case well analysis as defined by the Department]. The appropriate analyses are program specific. Note: Always consider the possible presence of non-aqueous phase liquids - both lighter than water (LNAPL) and denser than water (DNAPL).

c. Characterize contaminants physical and chemical properties, mobility in affected media, and toxicity. This information will be used to guide further assessment activities, design an appropriate monitoring system, and develop an appropriate remedial action.

d. Fully define the site geology, surface water and groundwater occurrence/movement sufficient to assess the lateral and vertical extent of contamination and to design a corrective action system (if warranted). This information may be obtained by reviewing site plans and area maps, geologic mapping, lineament studies, soil-test borings, wells, aquifer tests, geophysical techniques, etc.. Special emphasis should be given to determining how man-made or geologic features and their associated hydraulic properties influence contaminant migration. Consideration should be given to the pumping wells within the vicinity that may influence groundwater movement.

e. Utilize site screening techniques, such as direct-push sampling, soil-gas, or geophysical techniques to identify sources and estimate the lateral and vertical extent of contamination. This information can be used to assist in the optimal placement of permanent sampling locations. In many cases, data from permanent monitoring stations will be necessary to confirm the extent of contamination, determine the direction of groundwater flow, and to evaluate temporal variation in ground-water quality (including evaluations of the effectiveness of corrective actions).

f. Prepare detailed site maps (surveyed elevations and distances as appropriate) that include site features, contaminant sources, sample locations, and other features that may influence contaminant migration such as drainage features, buried pipes, septic systems, lagoons, pumping wells, etc..

2. Identify Potential Risks to Human Health and the Environment

a. Identify contaminants of concern that, as a result of their toxicity and detected concentrations, are considered to pose a current or future threat to human health or the environment.

b. Perform an exposure pathway analysis to evaluate the potential for the contaminants of concern to reach receptors at concentrations that may present a risk. Consider inhalation, ingestion, or dermal contact via exposure to surface water, groundwater, soil, air, etc.. The analysis may involve a public/private well survey, identification of discharge points of water and/or vapors, evaluation of public access to contaminated areas, etc.

C. Site Assessment Report(s) - The assessment report(s) should address the elements

investigated during the assessment such as the following: identification of all sources of contamination, the extent of the contamination in all affected media, the potential risks to human health and the environment, and, in general, sufficient data to allow an informed decision to be made concerning future actions (i.e., monitoring, design an appropriate and effective remedial action, etc.). Although the report contents will be site-specific, all reports should make optimum use of figures and tables to clearly and concisely present the data.

D. Initiate interim remedial actions, if warranted. This may include source removal, free-phase liquid removal, control of surface-water/sediment runoff, control of groundwater migration, control access to contaminated areas, etc..

III. Remedial Action Selection

The proposed remedial action(s) should be protective of human health and the environment, prevent the further migration of contaminants and reduce the volume of the contaminants in all affected media. The selection should be technically justified in the Remedial Action Plan.

A. Establish remedial objectives

1. Set short-term remedial goals, if appropriate, such as source removal or control, hydraulic control of the plume, etc..

2. Set long-term remedial goals, such as reduction of contaminant concentrations in ground water below established drinking water standards (as defined in S.C. Water Classifications and Standards R. 61-68), etc.

B. Identify appropriate remedial action(s). Consideration should be given to multi-method approaches and alternative technologies. The system should be flexible so that it can be expanded, if needed.

C. Predict effectiveness of proposed remedial action(s)

1. Use treatability studies and/or pilot tests to determine effectiveness of proposed action(s).

2. Perform aquifer simulations (calculations and/or computer models) and/or other predictive models (e.g., soil leaching models, etc.) to justify proposed remedial action(s).

D. Prepare Remedial Action Plan. The goal of any remedial action plan is to provide technical justification for the proposed remedial action. The plan should: fully

describe the remedial action selected; contain the results of any supporting studies (e.g., aquifer simulations, treatability studies, etc.); demonstrate how the selected remedial action will meet the clean-up objectives and goals; discuss permitting and design requirements and/or constraints; and contain an implementation schedule. The plan also should include monitoring and reporting programs and schedules for implementation of the selected remedial action.

E. Initiate permitting process (e.g., treatment and discharge permits) and obtain necessary access agreements, as soon as technically feasible.

F. Seek approval from the Department for proposed remedial action.

IV. Remedial Action Implementation

A. Submit an Engineering Report (separate from Remedial Action Plan) that contains engineering details for the system, operation and maintenance plans, the treatment system influent and effluent monitoring and reporting program, etc.

B. Obtain permit from the Department for construction of remedial action system and finalize any other appropriate permits.

C. Establish routine monitoring and reporting as described in the remedial action plan and engineering report. Data should be evaluated to determine the performance and effectiveness of the system in achieving the short-term remedial and/or long-term remedial goals.

D. Modify system, as appropriate, to accomplish the short-term and/or long-term goals. System modifications should be approved by the Department prior to implementation.